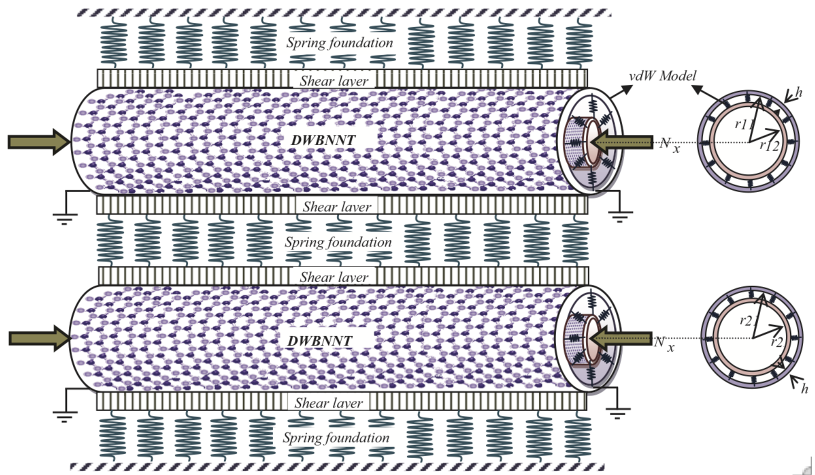
Professor A. Ghorbanpour Arani



From: "Electro-thermo–mechanical nonlinear buckling of Pasternak coupled DWBNNTs based on nonlocal piezoelasticity theory", by Ghorbanpour Arani, et al, Composites B, Vol. 43, No. 2, pp195-203, March 2012

See:
http://mechanic.kashanu.ac.ir/Files/Staff/Faculty/2013-06-19_10.01.44_Resume%20Web%2092.3.28.pdf
http://members.nanosociety.us/aghorban
http://aghorban.kashanu.ac.ir/faculty/fa
http://www.journalogy.net/Author/21804513/a-ghorbanpour-arani
For a list of publications, see:
http://80.191.138.137/modules.php?name=treeview&op=viewnodepage&nid=4326

Department of Mechanical Engineering
University of Kashan, Iran

Selected Publications:

A.R. Ranjbartoreh, A. Ghorbanpour and B. Soltani (Department of Mechanical Engineering, University of Kashan, Ghotb Ravandi Avenue, Kashan, 87317-51167, Iran), "Double-walled carbon nanotube with surrounding elastic medium under axial pressure", Physica E: Low-dimensional Systems and Nanostructures, Vol. 39, No. 2, September 2007, pp. 230-239, doi:10.1016/j.physe.2007.04.010
ABSTRACT: In this paper, the buckling behavior and critical axial pressure of double-walled carbon nanotubes (DWCNTs) with surrounding elastic medium are investigated. A double-shell (circular cylindrical shell) model

is presented and the effects of surrounding elastic medium on the outer tube and the van der Waals forces between two adjacent tubes are taken into account. The analysis and the numerical solution method are based on the classical theory of plates and shells and the Galerkin method. Equations are derived for the critical axial forces and pressures of DWCNTs; the critical axial forces and pressures are calculated for different axial half sine wavenumbers and circumferential sine wavenumbers and compared with those for single-walled carbon nanotubes (SWCNTs). Results indicate that the critical axial force of a DWCNT is higher than that of an SWCNT, but the critical axial pressure of a DWCNT is lower than the critical axial pressure of a SWCNT. Although the critical axial force of a DWCNT decreases as the axial half sine wavenumbers increase, it rises as the circumferential sine wavenumbers increase.

A. Ghorbanpour Arani, R. Rahmani and A. Arefmanesh (Department of Mechanical Engineering, Faculty of Engineering, University of Kashan, Kashan, I.R., Iran), "Elastic buckling analysis of single-walled carbon nanotube under combined loading by using the ANSYS software", Physica E: Low-dimensional Systems and Nanostructures, Vol. 40, No. 7, May 2008, pp. 2390-2395, Special Issue: Proceedings of the E-MRS 2007 Symposia L and M: Electron Transport in Low-Dimensional Carbon Structures and Science and Technology of Nanotubes and Nanowires, doi:10.1016/j.physe.2007.11.011
ABSTRACT: This paper studies the pure axially compressed buckling and combined loading effects of a cylindrical shell and an individual single-walled carbon nanotube (SWCNT). The results of finite element (FE) simulations of SWCNT using the ANSYS software are presented, and are compared with the classical (local) and continuum (nonlocal) mechanical theories. Critical axial stress and deflections are calculated for all the cases. Two types of buckling are considered in this study, namely, the shell buckling which depends on the radius-to-thickness ratio, and the column buckling which is controlled by the length-to-diameter ratio.

Ghorbanpour Arani A., Rahmani R., Arefmanesh A., Golabi S., "Buckling analysis of multi-walled carbon nanotubes under combined loading considering the effect of small length scale", Journal of Mechanical Science and Technology, Vol. 22, No. 3, 2008, pp. 429-439, doi: 10.1007/s12206-007-1045-2
ABSTRACT: The torsional and axially compressed buckling of an individual embedded multi-walled carbon nanotube (MWNTs) subjected to an internal and/or external radial pressure was investigated in this study. The emphasis is placed on new physical phenomena which are due to both the small length scale and the surrounding elastic medium. Multiwall carbon nanotubes which are considered in this study are classified into three categories based on the radius to thickness ratio, namely, thin, thick, and almost solid. Explicit formulas are derived for the van der Waals (vdW) interaction between any two layers of an MWNT based on the continuum cylindrical shell model. In most of the previous studies, the vdW interaction between two adjacent layers was considered only and the vdW interaction among other layers was neglected. Moreover, in these works, the vdW interaction coefficient was treated as a constant that was independent of the radii of the tubes. However, in the present model the vdW interaction coefficients are considered to be dependent on the change of interlayer spacing and the radii of the tubes. The effect of the small length scale is also considered in the present formulation. The results show that there is a unique buckling mode (m,n) corresponding to the critical shear stress. This result is obviously different from what is expected for the pure axially compressed buckling of an individual multi-walled carbon nanotube.

A. Ghorbanpour Arani, M. Shokravi, M. Mohammadimehr (Department of Mechanical Engineering, University of Kashan, Ravand, Kashan, Iran, email: a_ghorbanpour@yahoo.com (A. Ghorbanpour Arani).), "Buckling Analysis of a Double-Walled Carbon Nanotube Embedded in an Elastic Medium Using the Energy Method", Archive of SID, Journal of Solid Mechanics Vol. 1, No. 4 (2009) pp. 289-299

ABSTRACT: The axially compressed buckling of a double-walled carbon nanotabe surrounded by an elastic medium using the energy and the Rayleigh-Ritz methods is investigated in this paper. In this research, based on the elastic shell models at nano scale, the effects of the van der Waals forces between the inner and the outer tubes, the small scale and the surrounding elastic medium on the critical buckling load are considered. Normal stresses at the outer tube medium interface are also included in the current analysis. An expression is derived relating the external pressure to the buckling mode number, from which the critical pressure can be obtained. It is seen from the results that the critical pressure is dependent on the outer radius to thickness ratio, the material parameters of the surrounding elastic medium such as Young's modulus and Poisson's ratio. Moreover, it is shown that the critical pressure descend very quickly with increasing the half axial wave numbers.

M. Mohammadimehr, A. R. Saidi, A. Ghorbanpour Arani, A. Arefmanesh and Q. Han, "Torsional buckling of a DWCNT embedded on winkler and pasternak foundations using nonlocal theory", Journal of Mechanical Science and Technology, Vol. 24, No. 6, 2010, pp. 1289-1299, doi: 10.1007/s12206-010-0331-6
ABSTRACT: The small-scale effect on the torsional buckling of a double-walled carbon nanotube (DWCNT) embedded on Winkler and Pasternak foundations is investigated in this study using the theory of nonlocal elasticity. The effects of the surrounding elastic medium, such as the spring constant of the Winkler type and the shear constant of the Pasternak type, as well as the van der Waals (vdW) forces between the inner and the outer nanotubes are taken into account. Finally, based on the theory of nonlocal elasticity and by employing the continuum models, an elastic double-shell model is presented for the nonlocal torsional buckling load of a DWCNT. It is seen from the results that the shear constant of the Pasternak type increases the nonlocal critical torsional buckling load, while the difference between the presence and the absence of the shear constant of the Pasternak type becomes large. It is shown that the nonlocal critical buckling load is lower than the local critical buckling load. Moreover, a simplified analysis is carried out to estimate the nonlocal critical torque for the torsional buckling of a DWCNT.

A. Ghorbanpour Arani (1), M. Mohammadimehr (1 and 2), A.R. Saidi (2), S. Shogaei (1) and A. Arefmanesh(1)
(1) Department of Mechanical Engineering, Faculty of Engineering, University of Kashan, Kashan, Iran
(2) Department of Mechanical Engineering, Shahid Bahonar University of Kerman, Kerman, Iran
"Thermal buckling analysis of double-walled carbon nanotubes considering the small-scale length effect", Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science, January 2011, vol. 225, no. 1, pp. 248-256, doi: 10.1177/09544062JMES1975
ABSTRACT: In this article, the buckling analysis of a double-walled carbon nanotube (DWCNT) subjected to a uniform internal pressure in a thermal field is investigated. The effects of the temperature change, the surrounding elastic medium based on the Winkler model, and the van der Waals forces between the inner and the outer tubes are considered using the continuum cylindrical shell model. The small-length scale effect is also included in the present formulation. The results show that there is a unique buckling mode corresponding to each critical buckling load. Moreover, it is shown that the non-local critical buckling load is lower than the local critical buckling load. It is concluded that, at low temperatures, the critical buckling load for the infinitesimal buckling of a DWCNT increases as the magnitude of temperature change increases whereas at high temperatures, the critical buckling load decreases with the increasing of the temperature.

M. Mohammadimehr (1), A. R. Saidi (1), A. Ghorbanpour Arani (2) and Q. Han (3)
(1) Department of Mechanical Engineering, Shahid Bahonar University of Kerman, Kerman, Iran, mmohammadimehr@gmail.com , a_r_saidi@yahoo.com
(2) Department of Mechanical Engineering, Faculty of Engineering, University of Kashan, Kashan, Iran, aghorban@kashanu.ac.ir

(3) School of Civil Engineering and Transportation, South China University of Technology, Guangzhou, 510640, P. R. China, emqhan@scut.edu.cn
“Postbuckling Equilibrium Path of a Long Thin-Walled Cylindrical Shell (Single-Walled Carbon Nanotube) Under Axial Compression Using Energy Method”, Archive of SID, IJE Transactions A: Basics, Vol. 24, No. 1, January 2011, pp. 79-86
ABSTRACT: In this paper, an elastic shell model is presented for postbuckling prediction of a long thin- walled cylindrical shell under axial compression. The Ritz method is applied to solve the governing equilibrium equation of a cylindrical shell model based on the von-Karman type nonlinear differential equations. The postbuckling equilibrium path is obtained using the energy method for a long thin-walled cylindrical shell. Furthermore, the postbuckling relationship between the axial stress and end-shortening is investigated with different geometric parameters. Also, this theory is used for postbuckling analysis of a single-walled carbon nanotube without considering the small scale effects. Numerical results reveal that the single-walled carbon nanotube under axial compression has an unstable postbuckling behavior.